

What is claimed is:

1. A robot cleaner system, comprising:
  - an external recharging apparatus comprising a power terminal connected to a utility power supply;
  - 5 a recharging apparatus recognition mark formed on the external recharging apparatus;
  - a robot cleaner having a recognition mark sensor that detects the recharging apparatus recognition mark and a rechargeable battery, the robot cleaner automatically docking to the power terminal to recharge the
  - 10 rechargeable battery; and
  - a power terminal control unit installed in the external recharging apparatus, for supplying power only during recharging of the robot cleaner.
2. The robot cleaner system of claim 1, wherein the power terminal control unit comprises:
  - a power terminal supporting member;
  - a resilient member connected by one end to the power terminal supporting member and connected by the other end to the power terminal, for resiliently supporting the power terminal; and
  - 20 a micro-switch disposed between the power terminal and the power terminal supporting member, operating in accordance with a position change of the power terminal.

3. The robot cleaner system of claim 2, wherein the power terminal supporting member comprises:

a support bracket connected to a body of the external recharging apparatus; and

5 a recharging power supply device casing formed at a lower surface of the support bracket, and having a connection protrusion protruding from an upper surface for a connection with the micro-switch.

4. The robot cleaner system of claim 1, wherein the recharging 10 apparatus recognition mark is formed on a side of the power terminal.

5. The robot cleaner system of claim 4, wherein the recharging apparatus recognition mark is made of a retroreflective material, and the 15 recognition mark sensor is a photosensor that can detect the retroreflective material.

6. The robot cleaner system of claim 1, wherein the recharging apparatus recognition mark is formed on a floor in front of the external recharging apparatus.

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7. The robot cleaner system of claim 6, wherein the recharging apparatus recognition mark is a metal tape, and the recognition mark sensor is a proximity sensor capable of detecting the metal tape.

8. A robot cleaner system, comprising:

an external recharging apparatus comprising,

5 a power terminal connected to a utility power supply,

being disposed stationary in a predetermined location, and

a recharging apparatus recognition mark formed on a bottom ahead of the terminal block;

10 a robot cleaner comprising,

a recognition mark sensor formed on a bottom of a robot cleaner body to detect the recharging apparatus recognition mark,

a driving unit for moving the robot cleaner body,

15 an upper camera mounted on the robot cleaner body to capture images of a ceiling,

a bumper mounted on an outer circumference of the robot cleaner body, to output a collision signal when the robot cleaner collides with an obstacle,

20 a recharging terminal mounted on the bumper, connectible with the power terminal,

a rechargeable battery mounted on the robot cleaner body, recharged with a power fed through the recharging terminal, and

a control unit, upon a reception of a recharging command, detecting the recharging apparatus recognition mark by using the recognition

mark sensor, and controlling the driving unit to connect to the external recharging apparatus.

9. The robot cleaner system of claim 8, wherein the recharging apparatus recognition mark is formed in a perpendicular relation with respect to the terminal block.

10. The robot cleaner system of claim 9, wherein the recognition mark sensor is mounted on the bottom of the robot cleaner body in a direction where the bumper is mounted.

11. The robot cleaner system of claim 10, wherein the recognition mark sensor comprises three sensors.

15 12. The robot cleaner system of claim 10, wherein the recharging apparatus recognition mark is a metal tape, and the recognition mark sensor is a proximity sensor capable of detecting the metal tape.

13. The robot cleaner system of claim 8, wherein the control unit 20 determines the recharging terminal to be connected with the power terminal only when there is a collision signal received from the bumper, and a contact signal indicating contact between the recharging terminal and the power terminal.

14. The robot cleaner system of claim 8, wherein the robot cleaner further comprises a battery power measuring unit that detects remaining power of the rechargeable battery, and with a reception of a recharging request signal 5 from the battery power measuring unit, the robot cleaner stops performing an assigned job and returns to the external recharging apparatus.

15. The robot cleaner system of claim 8, wherein the robot cleaner returns to the external recharging apparatus when an assigned job is completed.

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16. A robot cleaner system, comprising:

a power terminal connected to a utility power supply;

an external recharging apparatus having the power terminal installed thereon, and a terminal block secured in a predetermined position;

a recharging apparatus recognition mark formed on a side of the power terminal in a front of the terminal block; and

a robot cleaner comprising,

20 a recognition mark sensor disposed on a body of the robot cleaner to detect the recharging apparatus recognition mark,

a driving portion for driving the body of the robot cleaner,

an upper camera mounted on the body of the robot cleaner to take images of ceiling,

a bumper mounted on an outer circumference of the body of the robot cleaner to output a collision signal in the case of collision with an obstacle,

5 a recharging terminal formed on the bumper in a connectible manner with the power terminal,

a rechargeable battery mounted on the body of the robot cleaner, charged with electricity through the recharging terminal, and

10 a control unit, upon reception of a recharging command, for detecting the recharging apparatus recognition mark by using the recognition mark sensor and controlling the driving portion, docking the robot cleaner into the external recharging apparatus.

17. The robot cleaner system of claim 16, wherein the recharging apparatus recognition mark is made of a retroreflective material, and the 15 recognition mark sensor is a photo sensor capable of detecting the retroreflective material.

18. The robot cleaner system of claim 17, wherein the recognition mark sensor is formed on a front side of the robot cleaner.

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19. The robot cleaner system of claim 18, wherein the recognition mark sensor is formed on both sides of the robot cleaner.

20. A robot cleaner system, comprising:

an external recharging apparatus connected to a utility power supply;

a robot cleaner comprising,

a body,

5 a driving portion for driving a plurality of wheels formed at a lower portion of the body,

an upper camera mounted on an upper portion of the body to take images of a ceiling in perpendicular relation with respect to an advancing direction of the robot cleaner, and

10 a remote controller for wirelessly controlling the robot cleaner,

a recharging apparatus recognition mark formed on the external recharging apparatus; and

a recognition mark sensor mounted on the body of the robot cleaner to detect the recharging apparatus recognition mark, wherein the remote 15 controller detects the recharging apparatus recognition mark by using the recognition mark sensor, and then controls the driving portion so that the robot cleaner docks into the external recharging apparatus for charging of a rechargeable battery.

20 21. The robot cleaner system of claim 20, wherein the recharging apparatus recognition mark is formed on a side of a power terminal.

22. The robot cleaner system of claim 21, wherein the recharging apparatus recognition mark is made of a retroreflective material, and the recognition mark sensor is a photosensor capable of detecting the retroreflective material.

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23. The robot cleaner system of claim 20, wherein the recharging apparatus recognition mark is formed on a floor in front of the external recharging apparatus.

10 24. The robot cleaner system of claim 23, wherein the recharging apparatus recognition mark is made of a metal tape, and the recognition mark sensor is a proximity sensor capable of detecting the metal tape.

15 25. A docking method of a robot cleaner for docking with an external recharging apparatus, comprising the steps of:  
the robot cleaner running off from a connection with the external recharging apparatus upon reception of a work start signal, the robot cleaner, upon detecting of a first location recognition mark through an upper camera during running, storing an upper image where the first location recognition mark is first detected as an entry spot information;

20 the robot cleaner performing an assigned job;  
upon input of a recharge command signal, the robot cleaner returning to an entry spot by using a current location information and the stored entry

spot information, the current location information calculated from the upper images captured by the upper camera;

detecting the external recharging apparatus by detecting through a sensor on a robot cleaner body a recharging apparatus recognition mark;

5 the robot cleaner connecting to a power terminal of the external recharging apparatus by a recharging terminal thereof; and

recharging a rechargeable battery with an external power through the recharging terminal.

10 26. The docking method of claim 25, wherein the step of detecting the external recharging apparatus comprises the steps of:

running the robot cleaner in forward direction;

determining whether there is an obstacle existing ahead using the robot cleaner;

15 running the robot cleaner in one direction following along the obstacle upon determining the obstacle;

determining whether a recharging apparatus recognition mark is detected during the running using the robot cleaner;

20 proceeding to the external recharging apparatus connecting step upon detection of the recharging apparatus recognition mark; and

determining whether the running distance exceeds a predetermined reference distance, and if so, rotating the robot cleaner by 180° and running

the robot cleaner to follow along the obstacle, upon no detection of the recharging apparatus recognition mark.

27. The docking method of claim 25, wherein the step of  
5 connecting the external recharging apparatus comprises the steps of:

rotating the robot cleaner so that the recharging terminal of the robot cleaner faces towards the external recharging apparatus;

running the robot cleaner and determining whether a collision signal with a bumper is received or not;

10 determining whether a contact signal is received or not, the contact signal indicating the recharging terminal of the robot cleaner contacts with the power terminal of the external recharging apparatus, after the collision signal of the bumper is received;

15 adjusting a running angle of the robot cleaner by a predetermined angle and determining whether the contact signal is received or not, upon no contact signal received after the reception of the collision signal from the bumper; and

20 retreating the robot cleaner to the entry spot when there is no contact signal received after a predetermined number of running angle adjustments of the robot cleaner.

28. The docking method of claim 27, wherein the adjustment to the running angle of the robot cleaner is set to 15° each time.

29. The docking method of claim 28, wherein the number of  
adjustments to the running angle of the robot cleaner is set to 6 times.

30. The docking method of claim 25, wherein the recharge  
5 command signal is generated when there is a shortage of power in the step of  
performing the assigned job, or when the step of performing the assigned job  
is completed.